



**CITY OF NEWTON, MASSACHUSETTS**  
Department of Planning and Development

Telephone  
(617)-796-1120

TDD/TTY  
(617) 796-1089

Fax  
(617) 796-1142

Setti D. Warren  
Mayor

Public Hearing Date:	October 12, 2010
Land Use Action Date:	December 14, 2010
Board of Aldermen Action Date:	January 3, 2011
90-Day Expiration Date:	January 4, 2011

DATE: October 5, 2010

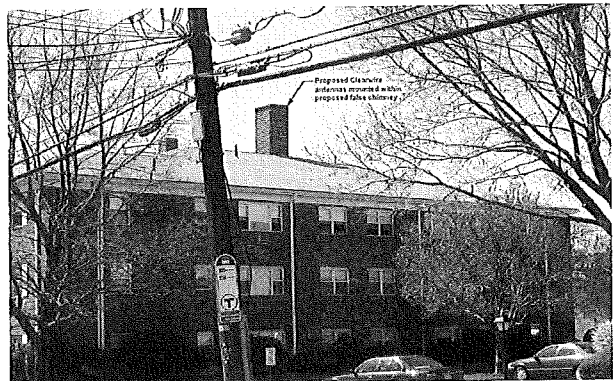
TO: Board of Aldermen

FROM: Candace Havens, Interim Director of Planning and Development  
Eve Tapper, Chief Planner for Current Planning **ET**  
Maurya Sullivan, Principal Planner/Telecommunications Specialist

SUBJECT: #215-10 CLEAR WIRELESS, LLC/CAPASSO ASSOCIATES LIMITED PARTNERSHIP petition for Special Permit to install 3 panel antennas and 2 wireless backhaul dishes within a stealth chimney on the roof of an existing apartment building at 199 LEXINGTON STREET, Ward 4, Auburndale, on land known as Sec 41, 31, 18A, containing 40,189 sq. ft. of land in a district zoned MULTI RESIDENCE 2. (Ref: Sec 30-24, 30-23, 30-18(A)(f) of the City of Newton Rev Zoning Ord, 2007).

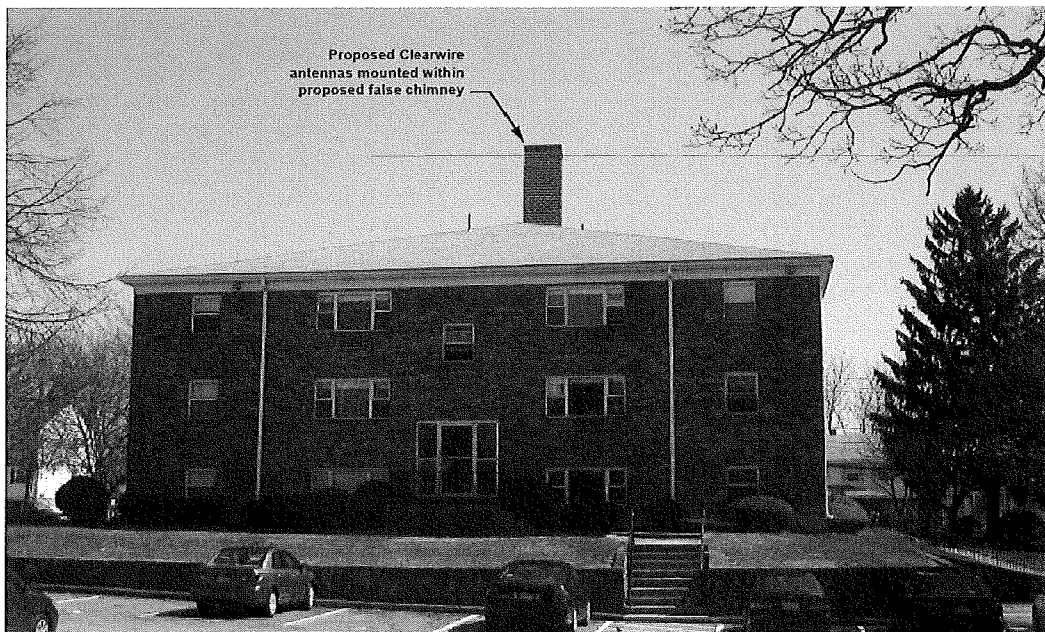
CC: Mayor Setti D. Warren

The purpose of this memorandum is to provide the Board of Aldermen and the public with technical information and planning analysis which may be useful in the special permit decision making process of the Board of Aldermen. The Planning Department's intention is to provide a balanced view of the issues with the information it has at the time of the public hearing. There may be other information presented at or after the public hearing that the Land Use Committee of the Board of Aldermen will want to consider in its discussion at a subsequent Working Session.



## EXECUTIVE SUMMARY

The petitioner proposes to install three panel antennas and two wireless backhaul dishes within a faux chimney on the roof of an existing apartment building. The chimney will be painted and textured to match the brick exterior of the building. Ancillary equipment will be located in an attic equipment room. An HVAC unit to be located at the rear of the building will be screened with existing and proposed evergreen shrubs. The proposed installation is substantially similar to an installation on the adjacent building at 181 Lexington Street. The proposal meets the design and operating criteria for wireless installations found in §30-18A(c).



Simulated modification – view from parking lot

### I. SIGNIFICANT ISSUES FOR CONSIDERATION

In reviewing this petition the Board should consider:

- whether this is an appropriate location for a wireless installation; and
- whether the addition of the antennas and ancillary equipment will have an impact on the surrounding neighborhood.

### II. CHARACTERISTICS OF THE SITE AND NEIGHBORHOOD

#### A. Neighborhood and Zoning

The site is abutted to the north by the former Rumford Avenue land fill; to the east by similar brick multi-family apartment buildings; to the west by other multi-family dwellings; and, south across Lexington Street, by predominantly single-family homes. The subject site and the abutting properties to the east and west are within a Multi Residence 2 District. The City's Rumford Avenue capped land fill to the

north is within the Public Use District. To the south across Lexington Street is a Single Residence 3 District.

B. Site

The site consists of an approximately 40,189 sq. ft. lot located on the north side of Lexington Street in Auburndale. The building is a three-story brick apartment building with 20 units. Parking is on the east side of the building and in the rear.

III. PROJECT DESCRIPTION AND ANALYSIS

A. Land Use

The site is currently used for residences. The petitioner proposes to install three panel antennas and two wireless backhaul dishes within a faux chimney on the roof of the existing apartment building, equipment within the attic, and one HVAC unit at ground-level in the rear of the building.

B. Site Design

The application entails the installation of 3 panel antennas and 2 wireless backhaul dishes within a faux chimney on the roof of the existing apartment building. The faux chimney will be painted and textured to match the brick exterior of the building. All cabling will be interior. Ancillary equipment will be located inside an attic equipment room.

The existing structure has a hipped roof, which precludes the location of the HVAC unit on the roof. Therefore, the rear of the building is an acceptable location. The petitioner proposes to screen the unit by the existing evergreen shrubs and the addition of additional evergreen shrubs. The petitioner has submitted a Noise Report (*SEE ATTACHMENT "E"*) indicating that the installation and HVAC unit complies with the noise ordinance.

This installation is substantially similar to that of a competing wireless carrier, T-Mobile, on the abutting property at 181 Lexington Street (BO # 91-07). There is not adequate room to accommodate another installation at 181 Lexington, therefore petitioner seeks to create a duplicate faux chimney on the subject building.

C. Parking and Circulation

The existing installation includes driveway access from Lexington Street. The petitioner proposes to continue using the same access. There will not be any personnel on-site except for approximately two vehicle trips per month for maintenance. These additional trips will not create a have significant impact upon the neighborhood.

D. Landscape Screening and Lighting

The antennas will be contained within a faux chimney and will have minimal visual impact. The ancillary equipment will be located in an attic equipment room. A single condenser unit will be located at the rear of the building and will be screened by existing and additional proposed evergreen shrubs.

IV. COMPREHENSIVE PLAN

There is little discussion of wireless installations in the 2007 *Newton Comprehensive Plan*. However, the *Comprehensive Plan* says that “development is to be guided to reflect the character held or sought by existing residential neighborhoods, protecting the qualities of that which exists.” By adding a hidden wireless installation to an existing building, this proposal minimizes changes to the character of this site and minimizes potential changes to the character of other sites that could be alternatives to the proposed installation.

V. TECHNICAL REVIEW

A. Technical Considerations (Section 30-15). The Zoning Review Memorandum provides an analysis of the proposal with regard to Section 30-18A. Pursuant to §30-18A(e)(6), a special permit is required for building-mounted wireless communication equipment in a residential district. The proposed installation meets the design and operating criteria found in §30-18A(c).

B. Parking Requirements (Section 30-19). The proposed changes do not trigger any additional parking requirements.

C. Other Reviews

1. Engineering. No engineering review is necessary because the petition will not increase or modify impervious surfaces on site.
2. Fire Department. Fire prevention review will occur as part of the building permit application process.

VI. ZONING RELIEFS SOUGHT

Based on the completed zoning review (*SEE ATTACHMENT “C”*) the petitioner is seeking approval through or relief from:

- §30-18A(e)(6), which allows the Board of Aldermen to grant a special permit for building-mounted wireless communication equipment in a residential district
- §30-18A(f), which allows the Board of Aldermen to approve the site plan
- §30-24, which allows the Board of Aldermen to grant a special permit for

building-mounted wireless communication equipment when §30-18A(a) & (c) have been satisfied

- §30-23, which allows the Board of Aldermen to grant site plan approval

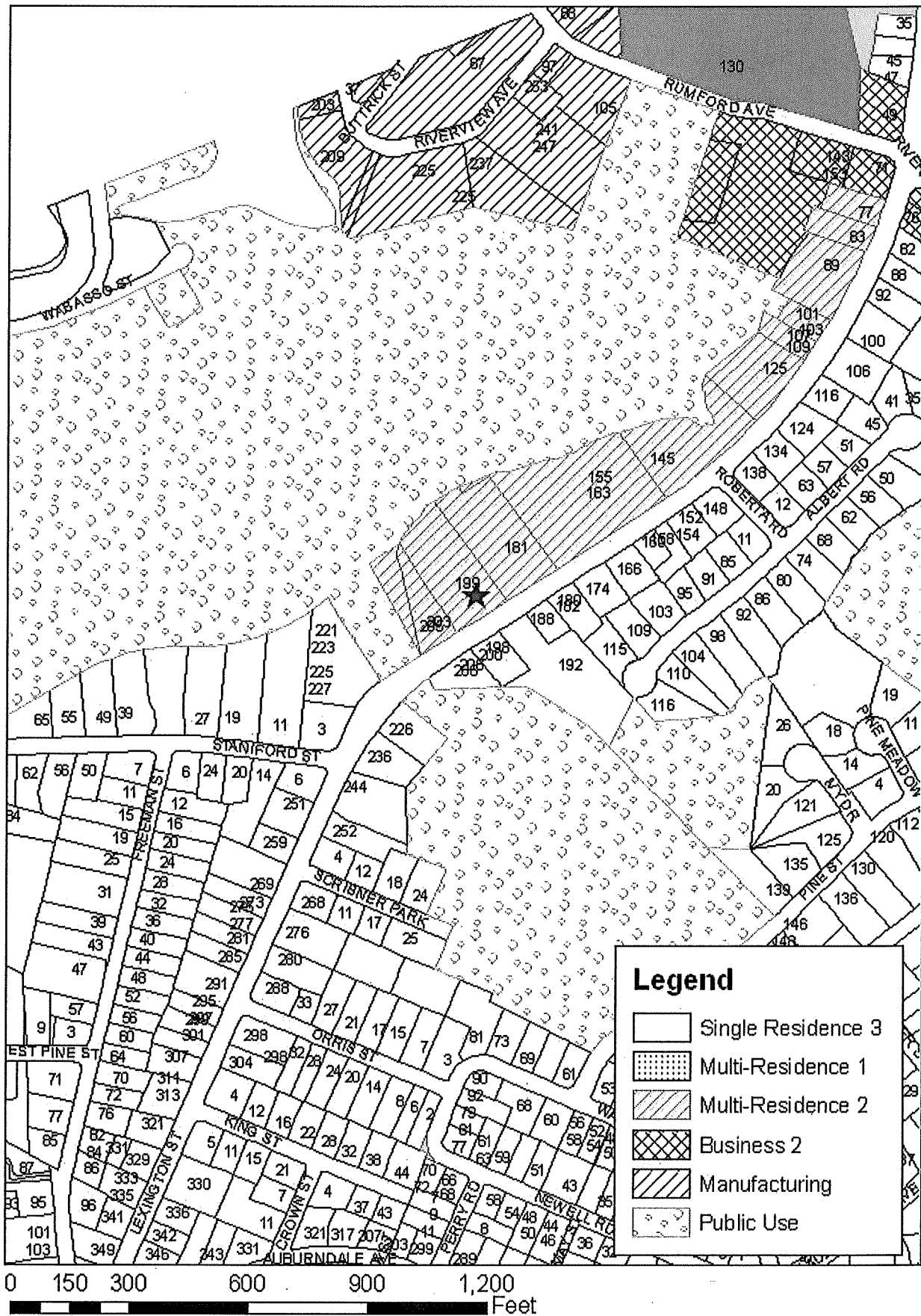
VII. Summary of Petitioner's Responsibilities

This petition is currently complete.

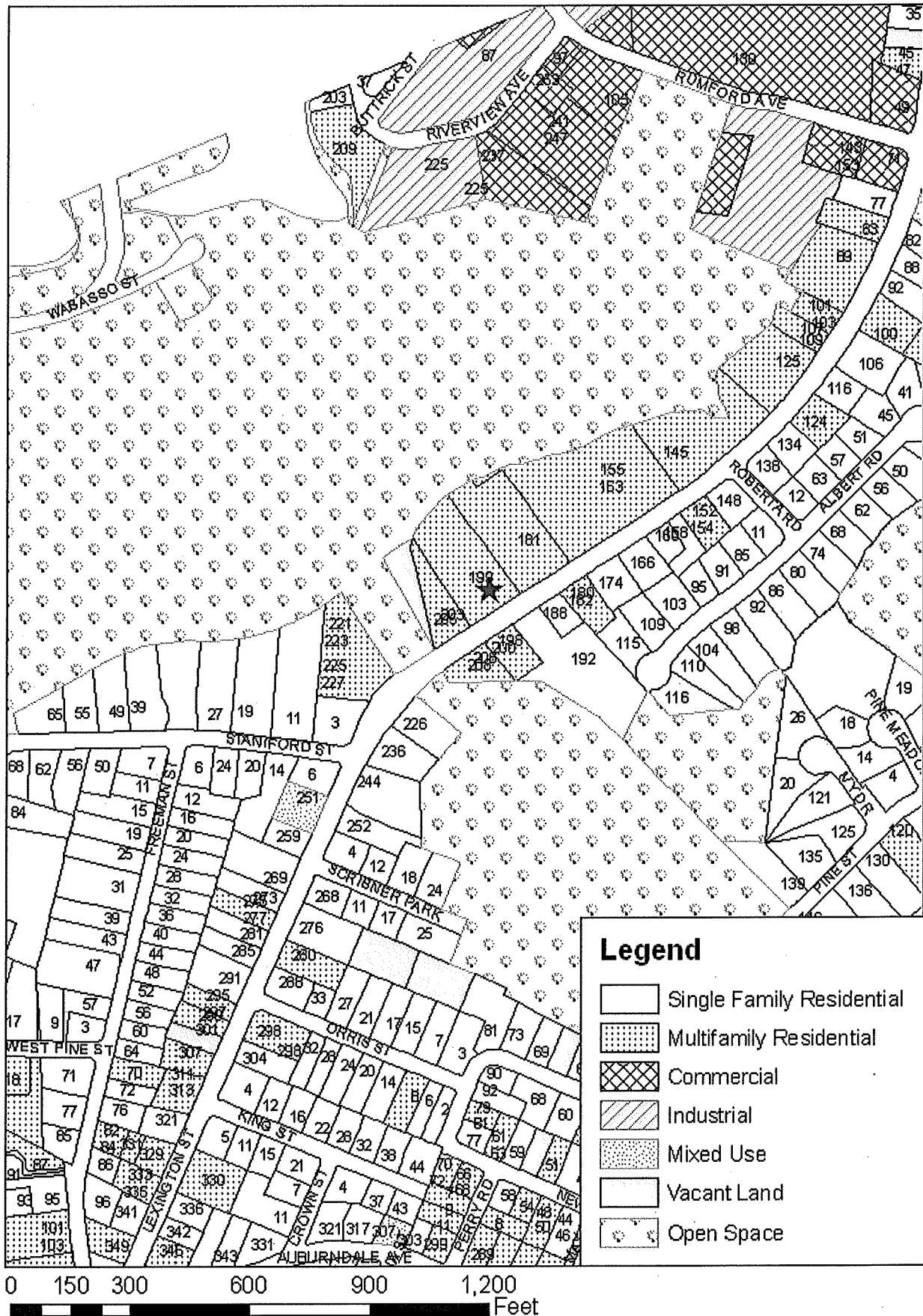
**ATTACHMENTS**

<b>ATTACHMENT A:</b>	<b><i>Zoning Map</i></b>
<b>ATTACHMENT B:</b>	<b><i>Land Use Map</i></b>
<b>ATTACHMENT C:</b>	<b><i>Zoning Review Memorandum</i></b>
<b>ATTACHMENT D:</b>	<b><i>RF Emissions Report</i></b>
<b>ATTACHMENT E:</b>	<b><i>Noise Report</i></b>

# 199 Lexington Vicinity, Zoning



# 199 Lexington Vicinity, Land Use



## ***Zoning Review Memorandum***

### ***Proposed Wireless Communication Installation***

To: John Lojek, Commissioner of Inspectional Services

From: Maurya Sullivan, Principal Planner/Telecommunications Specialist

cc: Candace Havens, Chief Planner/Interim Director of Planning and Development  
Eve Tapper, Chief Zoning Code Official  
Jason Ellis, Prince Lobel Glovsky & Type LLP

**Re: Proposed installation of 3 Panel Antennas and 2 Wireless Backhaul Dishes in MR2 District**

**Applicant:** Clearwire, LLC/Capasso Assoc. Ltd. Partnership

**Site:** 199 Lexington St.

**SBL:** 41-31-18A

**Lot Area:** 40,189 sq ft

**Zoning:** MR-2

**Current Use:** Apartment Building

**Proposed Use:** Wireless Communications

#### Type of Wireless Installation:

Installation of two dish antennas and three panel antennas in a residential district per Section 30-18A(e)(6). The proposed antennas will be concealed within a new faux chimney on the roof.

#### Background:

The property consists of an apartment used for multi-family residential purposes. The applicant seeks approval pursuant to Section 30-18A(e)(6), *Wireless Communication Equipment Allowed by Special Permit* because the installation is in a residential district.

#### Administrative determinations:

- ◆ Section 30-18A(e)(6) requires a special permit for building-mounted wireless communication equipment in residential districts.
- ◆ Sections 30-18A(f) and 30-24 require site plan review.
- ◆ The applicant has submitted a copy of the application to the Director of Planning and Development for Administrative Site Plan review, per Section 30-18A(g) for compliance with Section 30-18A(c).
- ◆ See table "Zoning Relief Summary" below.

#### ***Zoning Relief Summary***

<b><i>Ordinance</i></b>		<b><i>Action Required</i></b>
	<b>Wireless Communication Installation</b>	
30-18A(e)(6)	Building-mounted wireless communication installation on a multi-family structure	SP per §30-24
	<b>Site</b>	
30-18A(f)	Approval of site plan per §30-23	X



**Donald L. Haes, Jr., Ph.D., CHP**

*Radiation Safety Specialist*

MA Radiation Control Program Health Physics Services Provider Registration #65-0017

PO Box 368, Hudson, NH 03051

Voice: 603-303-9959

Fax: 603-386-6315

Email: donald\_haes\_chp@myfairpoint.net

---

August 31, 2010

**Re: Proposed installation of Clearwire personal wireless services antennas to be mounted on the Lexington Street Apartment building located at 199 Lexington Street in Newton, MA.**

**PURPOSE**

I have reviewed the information pertinent to the proposed installation at the above location. To determine regulatory compliance, theoretical calculations of maximal radio-frequency (RF) fields have been prepared. The physical conditions are that Clearwire personal wireless services (PWS) antennas are proposed to be mounted on the building (See Figure 1) within a "faux" chimney enclosure. The proposal calls for panel and back haul "dish" antennas to be mounted at centerlines of 39.75 feet and 43.75 feet above ground level (AGL), respectively. This report considers the contributions the proposed Clearwire transmitters operating at their FCC-licensed capacity. The calculated values of power density are presented as a percent of current Maximum Permissible Exposures (%MPE) as adopted by the Federal Communications Commission (FCC)<sup>1,2</sup>, and those established by the Massachusetts Department of Public Health (MDPH)<sup>3</sup>.

**SUMMARY**

Theoretical RF field calculations data for summation of the Clearwire RF contributions indicate a maximal potential RF field level at ground level to be about two-tenths of one percent of the current RF exposure guidelines. This result means that there could be almost 500 similar additional installations at this location, and still be within Federal and State guidelines for RF exposure. RF field levels within the building will be much lower. Access to the areas on the rooftop within 15 feet of the enclosure containing the antennas will have to be restricted due to the relatively low antenna mounting height. These RF field theoretical calculations were performed in accordance with the guidelines specified by the FCC in the Office of Engineering and Technology (OET) Bulletin number 65, and the MDPH.

Based on my extensive experience with personal wireless services facilities, and the theoretical RF fields I have calculated, it is my expert opinion that this facility would comply with all regulatory guidelines for RF exposure to members of the public with the addition of Clearwire personal wireless services.

---

**Note:** The analyses, conclusions and professional opinions are based upon the precise parameters and conditions of this particular site; **Building located at 199 Lexington Street in Newton, MA.** Utilization of these analyses, conclusions and professional opinions for any personal wireless services installation, existing or proposed, other than the aforementioned has not been sanctioned by the author, and therefore should not be accepted as evidence of regulatory compliance.



**Figure 1: Building at 199 Lexington Street in Newton, MA**

**NOTE: Similar installation (by others) can be seen on the adjacent building rooftop.  
(Picture courtesy Microsoft® Virtual Earth™ and may not represent current conditions)**

## **RF EXPOSURE LIMITS AND GUIDELINES**

The RF exposure guidelines adopted by the FCC are a combination of the standards published by the American National Standards Institute (ANSI) <sup>4</sup> and the National Council on Radiation Protection and Measurement (NCRP) <sup>5</sup>. Also applicable are those published by the MDPH <sup>3</sup>. The RF exposure guidelines are divided into two categories: "Controlled/Occupational areas" (those areas restricted to access by RF workers only) and "Uncontrolled/Public Areas" (those areas unrestricted for public access). Listed in Table 1 below are the applicable RF exposure guidelines for uncontrolled areas as they pertain to the operating frequency band of the proposed Clearwire wireless services.

**Table 1: Maximum Permissible Exposure Values for Uncontrolled/Public Areas**

Frequency Band:	Maximum Permissible Exposure:
1500 - 100,000 MHz	1000 $\mu\text{W}/\text{cm}^2$ *

Note: 1  $\mu\text{W}$  = 0.000001 Watt

\* For equivalent plane-wave power density, where  $f$  is the frequency in MHz ( $10^6$  Hz).

## THEORETICAL RF FIELD CALCULATIONS - GROUND LEVELS

These calculations are based on what are called "worst-case" estimates. That is, the estimates assume 100% use of all transmitters simultaneously. Although the panel antenna sectors and back haul antennas are to be directed along **different** azimuths, they are assumed to be directed along the **same** azimuth for calculation purposes. Additionally, the calculations make the assumption that the surrounding area is a flat plane. The resultant values are thus conservative in that they over predict actual resultant power densities. <sup>6</sup>

The calculations are based on the following information:

1. Effective Radiated Power (ERP).
2. Antenna height (centerline, above ground level (AGL)).
3. Antenna vertical radiation patterns; the source of the negative gain (G) values. "Directional" antennas are designed to focus the RF signal, resulting in "patterns" of signal loss and gain. Antenna vertical radiation patterns display the loss of signal strength relative to the direction of propagation due to elevation angle changes. The gain is expressed as " $G^E$ ".

Note: G is a unitless factor usually expressed in decibels (dB); where  $G = 10^{(dB/10)}$ .

For example: for  $G = 3$ ,  $dB = 10^{(3/10)} = 2$ ; for  $G = -3$ ,  $dB = 10^{(-3/10)} = 0.5$ .

To determine the magnitude of the RF field, the power density (S) from an isotropic RF source is calculated, making use of the power density formula: <sup>7</sup>

$$S = \frac{P \cdot G}{4 \cdot \pi \cdot R^2}$$

Where:  $P \rightarrow$  Power to antenna (watts)

$G \rightarrow$  Gain of antenna

$R \rightarrow$  Distance (range) from antenna source to point of intersection with the ground (feet)

$R^2 = (\text{Height})^2 + (\text{Horizontal distance})^2$

Since  $P \cdot G = \text{EIRP}$  (Effective Isotropic Radiated Power) for broadcast antennas, the equation can be presented in the following form:

$$S = \frac{\text{EIRP}}{4 \cdot \pi \cdot R^2}$$

In the situation of off-axis power density calculations, apply the negative elevation gain ( $G^E$ ) value from the vertical radiation patterns with the following formula:

$$S = \frac{\text{EIRP} \cdot G^E}{4 \cdot \pi \cdot R^2}$$

Ground reflections may add in phase with the direct wave, and essentially double the electric field intensity. Because power density is proportional to the *square* of the electric field, the power density may quadruple, that is, increase by a factor of four (4).

Since ERP is routinely used, it is necessary to convert ERP into EIRP; this is readily done by multiplying the ERP by the factor of 1.64, which is the gain of a half-wave dipole relative to an isotropic radiator. Therefore, downrange power density estimates can be calculated by using the formula:

$$S = \frac{4 \cdot [ERP \cdot 1.64] \cdot G^E}{4 \cdot \pi \cdot R^2} = \frac{ERP \cdot 1.64 \cdot G^E}{\pi \cdot R^2} = \frac{0.522 \cdot ERP \cdot G^E}{R^2}$$

The theoretical power density calculations for the proposed Clearwire RF contributions are listed in Tables 2 - 3 for each three degree increment of depression angle (90° being straight down at the base of the building, and 0° being straight out from the antenna). The values have been calculated for a height of six feet above ground level in accordance with regulatory rationale.

To calculate the % MPE, use the formula:

$$\% \text{ MPE} = \frac{S}{\text{MPE}} \cdot 100$$

The theoretical percent Maximum Permissible Exposure calculations for the Clearwire RF contributions are also listed in Tables 2 - 3 for the same angle and height conditions. The results of the calculations for the **summation** of the Clearwire personal wireless services RF contributions are depicted in Figure 2 as plotted against linear distance from the base of the building. In addition to the six foot height, and depicted on the graph for reference only, values have been plotted for a height of 16 feet above ground level for comparison with a typical two-story structure. Note that a logarithmic scale is used to plot the calculated theoretical %MPE values in order to compare with the MPE of 100%, which is so much larger that it would be off the page in a linear plot.

NOTE: The curves in Figure 2 resemble a straight-line on the log-linear plot at distances beyond about two thousand feet. Within about two thousand feet, the curves are variable due to the application of the vertical radiation patterns.

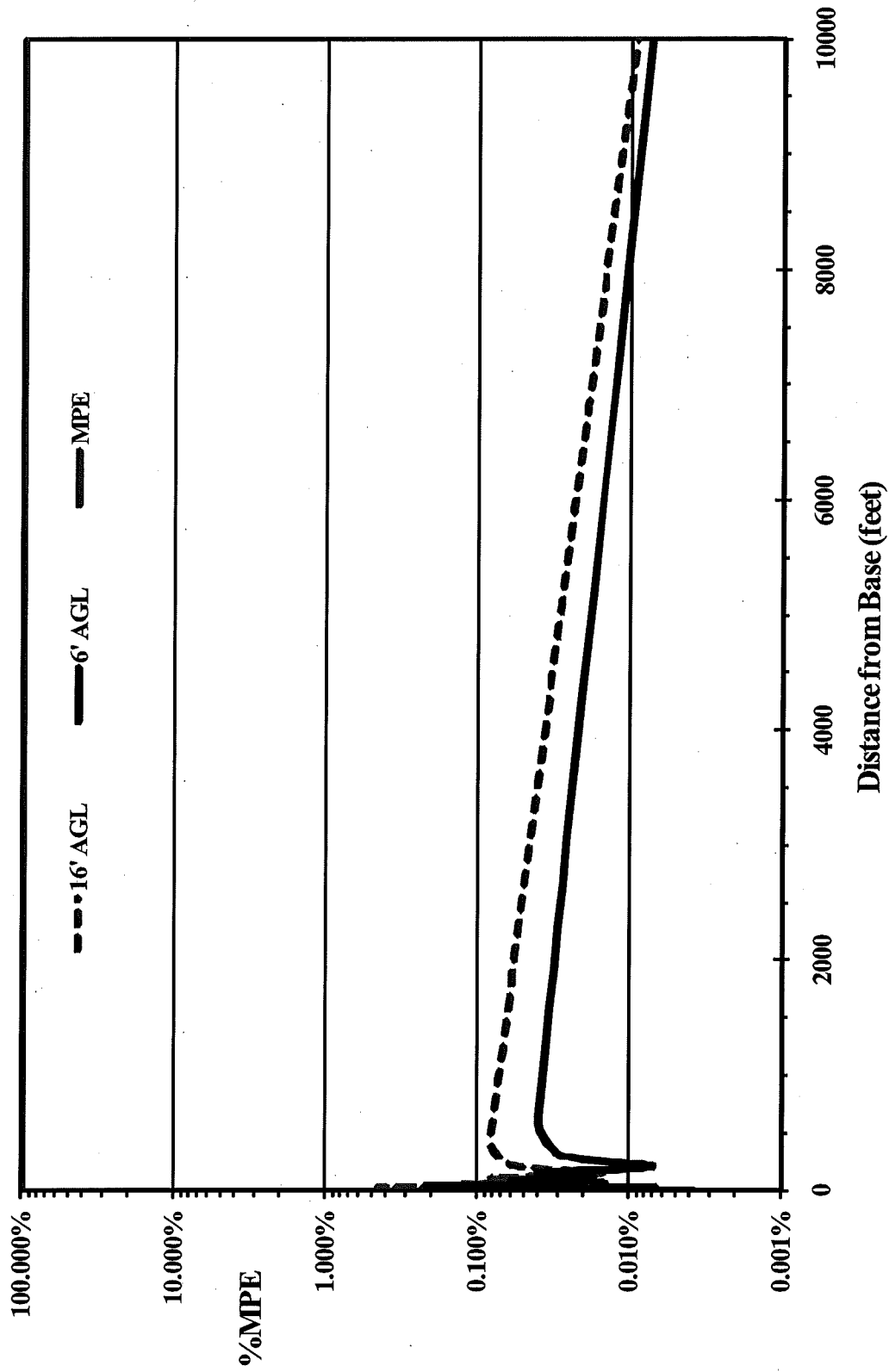
**Table 2: Theoretical RF Field Calculations for  
Proposed Clearwire Panel Antenna Contributions  
Building Located at 199 Lexington Street in Newton, MA**

ERP = 430 watts (per sector) @ $f \sim 2500$ MHz				
Panel Antenna, Height = 39.75 feet (AGL, centerline)				
General Population MPE = $1000 \mu\text{W}/\text{cm}^2$ @ $f > 1500$ MHz				
Depression Angle (degrees)	Gain (dB)	Distance from base (feet)	Power Density ( $\mu\text{W}/\text{cm}^2$ ) @ 6' AGL	Percent MPE @ 6' AGL
-90	-41.6	0	0.015	0.001%
-87	-36.8	2	0.044	0.004%
-84	-37.9	4	0.034	0.003%
-81	-31.1	5	0.161	0.016%
-78	-29.8	7	0.213	0.021%
-75	-24.3	9	0.735	0.074%
-72	-31.1	11	0.149	0.015%
-69	-28.7	13	0.249	0.025%
-66	-28.2	15	0.268	0.027%
-63	-29.6	17	0.185	0.018%
-60	-37.3	19	0.030	0.003%
-57	-32.5	22	0.084	0.008%
-54	-26.8	25	0.290	0.029%
-51	-26.6	27	0.280	0.028%
-48	-38.4	30	0.017	0.002%
-45	-25.8	34	0.279	0.028%
-42	-18.3	37	1.405	0.140%
-39	-15.9	42	2.159	0.216%
-36	-16.7	46	1.567	0.157%
-33	-20.4	52	0.574	0.057%
-30	-24.1	58	0.206	0.021%
-27	-25.6	66	0.120	0.012%
-24	-20.6	76	0.306	0.031%
-21	-16.7	88	0.582	0.058%
-18	-19.8	104	0.212	0.021%
-15	-19.5	126	0.159	0.016%
-12	-13.7	159	0.391	0.039%
-9	-19.3	213	0.061	0.006%
-6	-9.1	321	0.285	0.029%
-3	-1.8	644	0.384	0.038%
0	0	$\infty$	< 0.001	< 0.001%

**Table 3: Theoretical RF Field Calculations for  
Proposed Clearwire Back Haul "Dish" Antenna Contributions  
Building Located at 199 Lexington Street in Newton, MA**

ERP ~ 914 watts (total) @ $f \sim 18-28$ GHz 2 Total "Dish" Antenna (typical 1'-2' diameter), Height = 43.75 feet (AGL, centerline) General Population MPE = $1000 \mu\text{W}/\text{cm}^2$ @ $f > 1500$ MHz				
Depression Angle (degrees)	Gain (dB)	Distance from base (feet)	Power Density ( $\mu\text{W}/\text{cm}^2$ ) @ 6' AGL	Percent MPE @ 6' AGL
-90	-42.0	0	0.023	0.002%
-87	-42.0	2	0.023	0.002%
-84	-42.0	4	0.022	0.002%
-81	-42.0	6	0.022	0.002%
-78	-41.0	8	0.027	0.003%
-75	-41.0	10	0.027	0.003%
-72	-40.0	12	0.033	0.003%
-69	-40.0	14	0.031	0.003%
-66	-39.0	17	0.038	0.004%
-63	-38.0	19	0.045	0.005%
-60	-37.0	22	0.054	0.005%
-57	-36.0	25	0.064	0.006%
-54	-36.0	27	0.059	0.006%
-51	-36.0	31	0.055	0.005%
-48	-36.0	34	0.050	0.005%
-45	-36.0	38	0.045	0.005%
-42	-36.0	42	0.041	0.004%
-39	-36.0	47	0.036	0.004%
-36	-35.0	52	0.039	0.004%
-33	-35.0	58	0.034	0.003%
-30	-35.0	65	0.028	0.003%
-27	-35.0	74	0.023	0.002%
-24	-35.0	85	0.019	0.002%
-21	-35.0	98	0.015	0.001%
-18	-35.0	116	0.011	0.001%
-15	-32.0	141	0.015	0.002%
-12	-36.0	178	0.004	0.000%
-9	-30.0	238	0.009	0.001%
-6	-25.0	359	0.012	0.001%
-3	-18.0	720	0.016	0.002%
0	0	$\infty$	< 0.001	< 0.001%

**Figure 2: Theoretical Maximum Percent MPE - vs. - Distance  
Including Proposed Clearwire RF Contributions**



## **THEORETICAL RF FIELD CALCULATIONS**

### **WITHIN THE BUILDING, 10' UNDER THE ANTENNAS**

In addition to intensity losses at angles away from the main beam (90° down), there are losses due to attenuation by building materials. A good approximation of these losses is -10 dB, or a factor of 1/10 { $10^{(-10/10)} = 0.1$ ). Thus, a modified equation to use would be as follows:

$$S = \frac{4 \cdot [ERP \cdot 1.64] \cdot G^{(\text{antenna loss})} \cdot G^{(\text{building materials loss})}}{4 \cdot \pi \cdot R^2}$$

$$\% \text{ MPE} = \frac{S}{\text{MPE}} \cdot 100$$

**For the Clearwire panel antennas (any):**

$$S = 0.017 \mu\text{W}/\text{cm}^2 \text{ or } 0.002 \% \text{ MPE}$$

**For the Clearwire back haul antennas (any):**

$$S = 0.032 \mu\text{W}/\text{cm}^2 \text{ or } 0.003 \% \text{ MPE}$$

**The total is 0.005% MPE or >20,000 times below the exposure guidelines.**

### **ON THE ROOF TOP, DIRECTLY IN LINE WITH THE ANTENNAS**

The antennas are proposed to be mounted within the enclosure such that the bottom of the antennas are not greater than 2 meters above the roof. Thus, access to the areas on the rooftop within 15 feet of the enclosure containing the antennas will have to be restricted due to the relatively low antenna mounting height. Alternatively, the sector may be de-energized when the area directly in front of the enclosure needs to be accessed.



## CONCLUSION

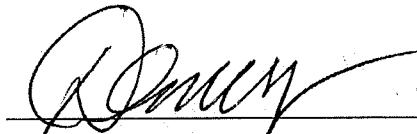
Theoretical RF field calculations data for summation of the Clearwire RF contributions indicate a maximal potential RF field level at ground level to be about two-tenths of one percent of the current RF exposure guidelines. This result means that there could be almost 500 similar additional installations at this location, and still be within Federal and State guidelines for RF exposure. RF field levels within the building will be much lower. Access to the areas on the rooftop within 15 feet of the enclosure containing the antennas will have to be restricted due to the relatively low antenna mounting height. These RF field theoretical calculations were performed in accordance with the guidelines specified by the FCC in the Office of Engineering and Technology (OET) Bulletin number 65, and the MDPH.

The number and duration of calls passing through personal wireless services facilities cannot be accurately predicted. Thus, in order to estimate the highest RF fields possible from operation of these installations, the maximal amount of usage was considered. Even in this so-called "worst-case," the resultant increase in RF field levels are far below established levels considered safe.

Based on my extensive experience with personal wireless services facilities, and the theoretical RF fields I have calculated, it is my expert opinion that this facility would comply with all regulatory guidelines for RF exposure to members of the public with the addition of Clearwire personal wireless services.

Feel free to contact me if you have any questions.

Sincerely



Donald L. Haes, Jr., Ph.D

*Certified Health Physicist*

---

**Note:** The analyses, conclusions and professional opinions are based upon the precise parameters and conditions of this particular site; **Building located at 199 Lexington Street in Newton, MA.** Utilization of these analyses, conclusions and professional opinions for any personal wireless services installation, existing or proposed, other than the aforementioned has not been sanctioned by the author, and therefore should not be accepted as evidence of regulatory compliance.

***Donald L. Haes, Jr., Ph.D., CHP***

*Radiation Safety Specialist*

MA Radiation Control Program Health Physics Services Provider Registration #65-0017

PO Box 368, Hudson, NH 03051

Voice: 603-303-9959

Fax: 603-386-6315

Email: donald\_haes\_chp@myfairpoint.net

---

***STATEMENT OF CERTIFICATION***

1. I certify to the best of my knowledge and belief, the statements of fact contained in this report are true and correct.
2. The reported analyses, opinions, and conclusions are limited only by the reported assumptions and limiting conditions, and are personal, unbiased professional analyses, opinions and conclusions.
3. I have no present or prospective interest in the property that is the subject of this report and I have no personal interest or bias with respect to the parties involved.
4. My compensation is not contingent upon the reporting of a predetermined energy level or direction in energy level that favors the cause of the client, the amount of energy level estimate, the attainment of a stipulated result, or the occurrence of a subsequent event.
5. This assignment was not based on a requested minimum environmental energy level or specific power density.
6. My compensation is not contingent on an action or event resulting from the analyses, opinions, or conclusions in, or the use of, this report.
7. The consultant has accepted this assessment assignment having the knowledge and experience necessary to complete the assignment competently.
8. My analyses, opinions, and conclusions were developed and this report has been prepared, in conformity with the American Board of Health Physics (ABHP) statement of standards of professional responsibility for Certified Health Physicist.



Donald L. Haes, Jr., Ph.D

*Certified Health Physicist*

August 31, 2010

Date

## ENDNOTES

- 1 . Federal Register, Federal Communications Commission Rules; *Radiofrequency radiation; environmental effects evaluation guidelines* Volume 1, No. 153, 41006-41199, August 7, 1996. (47 CFR Part 1; Federal Communications Commission).
- 2 . Telecommunications Act of 1996, 47 USC; Second Session of the 104<sup>th</sup> Congress of the United States of America, January 3, 1996.
- 3 . 105 CMR 122.000: Massachusetts Department of Public Health, *Non-Ionizing Radiation Limits for: The General Public from Non-Occupational Exposure to Electromagnetic Fields, Employees from Occupational Exposure to Electromagnetic Fields, and Exposure from Microwave Ovens*.
- 4 . ANSI/IEEE C95.1-1999: American National Standard, *Safety levels with respect to human exposure to radio frequency electromagnetic fields, from 3 KHz to 300 GHz (Updated in 2005)*.
- 5 . National Council on Radiation Protection and Measurements (NCRP); *Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields*, NCRP Report 86, 1986.
- 6 . Petersen RC and Testagrossa PA: *Radio-Frequency Electromagnetic Fields Associated With Cellular-Radio Cell-Site Antennas*. Bioelectromagnetics, 13: 527-542; 1992.
- 7 . OET Bulletin 65: Federal Communications Commission Office of Engineering and Technology, *Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields*; Edition 97-01, August 1999.



October 7, 2010

Mr. Jerry Bruno  
Construction Project Manager  
Consultant for Clearwire US, LLC  
Maxton Technology, Inc.  
241 Boston Post Road West  
Marlborough, MA 01752

(via email: Jerry.Bruno@maxtontech.com)

Subject: Wireless Communications Facility Noise Study  
199 Lexington Street, Newton, MA  
Clearwire MA-BOS7214B Lexington Street Apartments  
Acentech Project No. 621041

Dear Mr. Bruno:

At your request, we performed a sound study for the proposed installation of a new WiMax equipment cabinet and supporting air handling and condenser units at the apartment building at 199 Lexington Street in Newton, Massachusetts. The proposed location for the equipment cabinet and air handling unit is within the attic space of the apartment building with the condenser unit located outside near the southwest entrance. The purpose of this study was to evaluate whether the proposed installation would meet the noise ordinance of the City of Newton which includes the following requirements:

**Excerpt from Newton City Ordinance: Section 20-13. Noise control. Parts (e)(2), (e)(3) and (g)(6)<sup>1</sup>**

*(e) Noise Pollution prohibited.*

- (2) When the offending noise source is located in public spaces, noise measurements shall be made at, and noise pollution determinations made in relation to, any location a passerby might reasonably occupy. When the offending noise source is located on private property, noise measurements shall be made at, and noise pollution determinations made in relation to, the boundary line of the property within which the offending source is located, or as close thereto as feasible.
- (3) All noise level measurements made pursuant to subsection (e) shall be made with a Type I or II A-weighted sound level meter as specified under the American National Standards Institute (ANSI) standards.

*(g) Maximum Noise Levels.* Notwithstanding the provisions of subsections (e)(1) and (e)(2), the following are the maximum noise levels that are permitted for the specified noise sources:

---

<sup>1</sup> The complete City of Newton noise ordinance is provided in Appendix B for reference.

- (6) Maximum Noise Levels for HVAC systems. No person shall operate any air conditioning, refrigeration or heating equipment for any residence or other structure or operate any pumping, filtering or heating equipment for any pool or reservoir in such manner as to create any noise which would cause the noise level on the premises of any other occupied property or if a condominium, apartment house, duplex, or attached business, within any adjoining unit, to exceed the background noise level by more than 5 dB(A). This provision shall not apply, however, to periodic or emergency maintenance or testing of such equipment reasonably necessary to maintain such equipment in good working order. Noise measurements and noise pollution determinations shall be taken in accordance with subsections (e)(2) and (e)(3).

Using these requirements, we evaluated the sound levels that would be generated by each of three planned sources for the site, including: 1) an air conditioner within the WiMax cabinet to be located in the proposed attic space; 2) an air handling unit to be located on the wall within the proposed attic space, and 3) a condenser unit (paired with the air handling unit in the attic) to be located outdoors near the building's facade.

### **Measurements and Estimates**

We measured the outdoor A-weighted sound levels at the site continuously from 12pm on Wednesday, September 29, 2010 to 1pm on Monday, October 4, 2010. The measurement was carried out with a Larson Davis Model 870 Type I Sound Level Meter with certification and calibration traceable to the National Institute of Standards and Technology. Weather conditions over the measurement period included dry and rainy conditions, day and night temperatures ranging from 49 to 84 degrees F, and variable wind speeds (4 to 7 mph). While onsite at 12pm on September 29, we also measured the interior sound levels in the 3<sup>rd</sup> floor corridor and stairwell as a representation of the sound level within the 3<sup>rd</sup> floor units. This measurement was carried out with a Rion Model NA-28 Type I Sound Level Meter (1/3-Octave Band Analyzer) also with certification and calibration traceable to the National Institute of Standards and Technology. Instrumentation types and models for all measurements are provided in Appendix Table A1.

Figures 1 and 2 provide an aerial photograph of the site and a photograph of our outdoor sound measurement location, respectively. The proposed WiMax equipment would be located within a designated room to be constructed in the existing attic space, slightly northwest from the center of the building. A supporting condenser unit would be located directly outside of the apartment building to the southwest. The surrounding area includes other apartment buildings, single-family homes and recreational fields. The primary sound source at the facility is local roadway traffic.

Figure 3 provides the hourly outdoor sound level metrics recorded during the measurement period, including the Leq (equivalent energy-averaged sound level), Lmax (maximum sound level), L90 (sound level exceeded 90% of the hour, typically used as the background ambient sound level), and Lmin (minimum sound level). The Terminology section in Appendix A provides further description of these metrics. Figure 4 provides the L90 sound spectra measured inside the 3<sup>rd</sup> floor corridor and stairwell with windows closed.

### ***Future Projected Sound Levels***

The noise ordinance of the City of Newton specifically requires that the sound level generated by the HVAC sources does not exceed the existing background level by more than 5 dBA. For the air handling and air conditioner sources located within the attic space, we evaluated the sound transmission that would

Mr. Jerry Bruno  
Maxton Technology, Inc.  
October 7, 2010  
Page 3

be expected in the closest residential apartment unit below the site. For the condenser source located outdoors, we evaluated the expected sound level at the nearest property line to the source location. Using the sound level data provided by the manufacturers, the measured sound levels, the proposed location of the planned equipment, and details provided to us regarding attic floor/unit ceiling and exterior window construction (based on drawings dated March 31, 2010 and email correspondence on October 6, 2010), Table 1 provides the computed future projected sound levels at the closest noise-sensitive receptors for each of the three HVAC sound sources of the proposed installation.

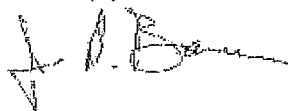
### Conclusions and Recommendations

We find that the noise sources identified will result in an increase to existing ambient sound levels at nearby receiver locations of not more than 3 dBA, and that the design therefore complies with the pertinent portions of the Newton City Code excerpted above.

Our measurements suggest that equipment associated with the WiMax cabinet may impart vibrations to the floor if installed in the fashion indicated. As a precaution, we recommend that the cabinet and wall-mounted unit be mounted or supported on neoprene mounts or pads to separate it from the attic floor and control potential vibrations. We recommend mounts or pads similar to Mason Industries type ND mounts or Super W pads, selected and configured to achieve at least 0.10" minimum static deflection under load.

I trust that this information serves your needs at this time. Please contact me (617-499-8018 or [jbarnes@acentech.com](mailto:jbarnes@acentech.com)) to discuss any questions or comments about this letter or our study.

Sincerely yours,



James D. Barnes, P.E.  
Acentech Incorporated

cc: Marc Newmark, Acentech Incorporated

Figures 1 to 4  
Tables 1 and A1  
Appendices A and B

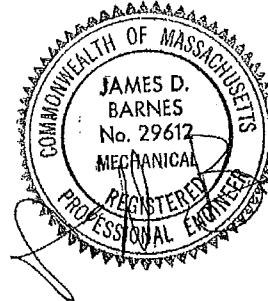


Table 1. Measured and Projected Sound Levels at 199 Lexington Street

Source	Proposed Location	Closest Noise-Sensitive Receptor	Background Sound Level (dBA) at Receptor <sup>1</sup>	Projected Equipment Sound Level (dBA) at Receptor <sup>2</sup>	Projected Increase in Sound Level (dBA) at Receptor	Meets Noise Ordinance? <sup>3</sup>
Equipment Cabinet (With A/C Unit)	Attic Space	Residential Unit on 3 <sup>rd</sup> Floor Below	32	31	3	Yes
Air Handling Unit	Attic Space	Residential Unit on 3 <sup>rd</sup> Floor Below	32	14	0	Yes
Condenser Unit	Outdoor/ Next to Facade	SW Property Line (Adjacent Residence)	39	21	0	Yes
		Inside Closest 1 <sup>st</sup> Floor Apartment	32	17	0	Yes

<sup>1</sup> Based on measured exterior L90 sound level and measured/assumed interior L90 sound level

<sup>2</sup> Based on manufacturer's specifications, distance from source, and predicted transmission loss due to building elements (i.e. attic floor/unit ceiling and windows).

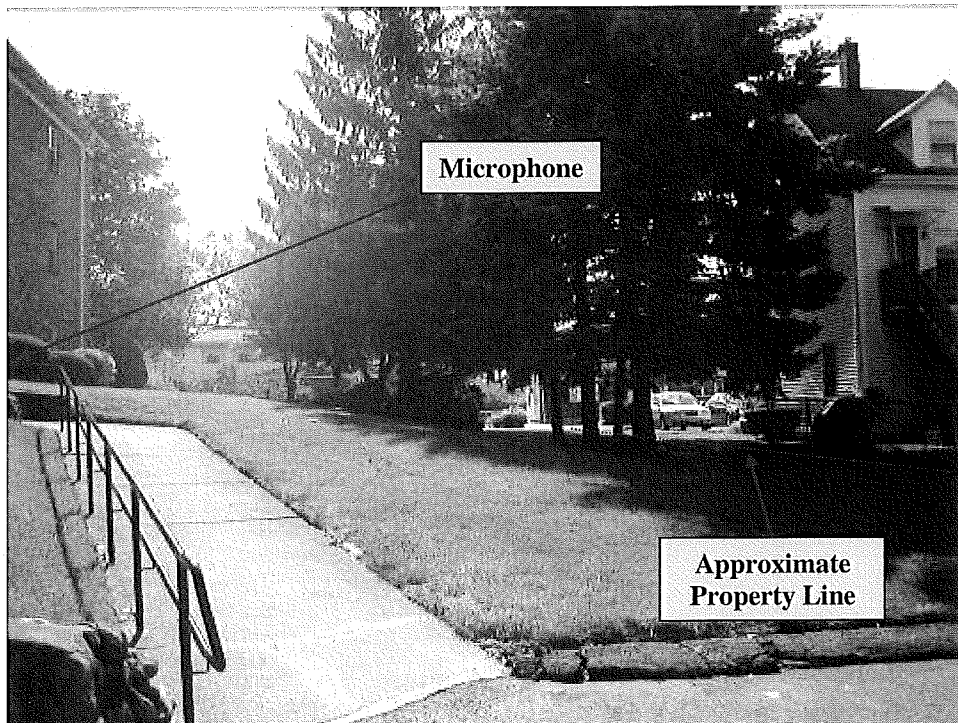
<sup>3</sup> Less than 5 dBA above background sound level

**Figure 1. Aerial Photograph of Proposed Site at 199 Lexington Street in Newton, Massachusetts**

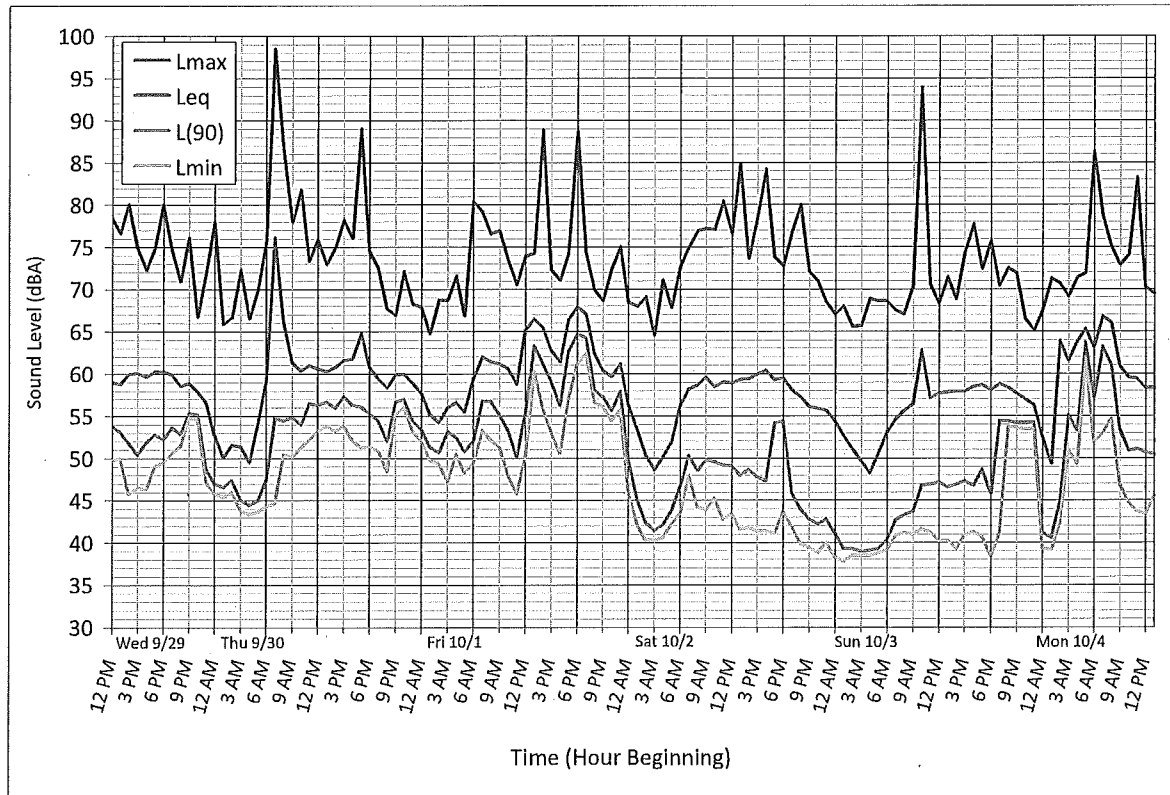




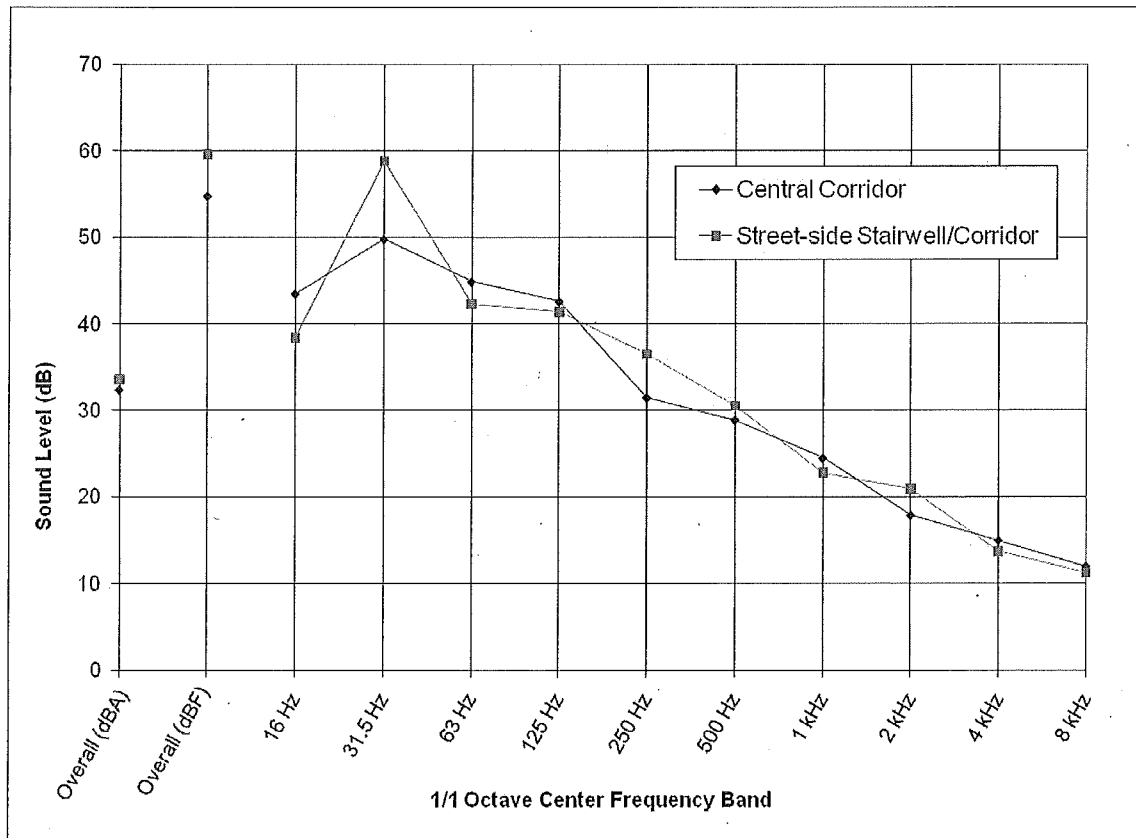
**Figure 2. Measurement Location at 199 Lexington Street, Newton, Massachusetts**



**Figure 3. Existing Sound Levels at 199 Lexington Street  
Measured from September 29 to October 4, 2010**



**Figure 4. L90 Sound Level Spectra in 3<sup>rd</sup> Floor Corridor of 199 Lexington Street  
With Corridor Doors and Exterior Windows Closed  
Measured at 12pm on September 29, 2010**



## Appendix A. Terminology

Provided below are informal descriptions of several technical terms as they are used in this report. For detailed technical definitions, it is suggested that the reader refer to textbooks or standards dealing with acoustics.

A-weighted Sound Level (dBA) – Sound measured with a standard sound level meter that emphasizes mid-frequency sounds simulating the way people hear, and correlates well with subjective judgments of the loudness of most sounds.

Ambient Sound – The total sound at a location from sources near and far.

Equivalent Sound Level (Leq) – A commonly used logarithmic energy-average of the measured sound level over a stated time period.

Lmax (Maximum Sound Level) – The maximum sound level during the measurement period.

L90 (Statistical Sound Level) – The sound level exceeded 90% of the measurement period. For hourly measurements, this corresponds to the sound level exceeded 54 minutes out of the hour. This is commonly used to define the background ambient sound level for a given location.

Lmin (Minimum Sound Level) – The minimum sound level during the measurement period.

Noise – Commonly defined as simply unwanted sound.

Noise Level or Sound Level (dB or dBA) – A commonly used logarithmic measure of the magnitude of a noise, computed as twenty times the common logarithm of the ratio of the root-mean-square pressure of a sound to the reference sound pressure of 20  $\mu$ Pa (in air).

Spectra – The distribution and variability of sound levels across a range of frequencies or frequency bands.

**Table A1. Acoustic Instrumentation Used for Sound Measurements**

Instrumentation Type	Manufacturer/Model	Serial No.
Type I Sound Level Meter	Larson Davis 870	1180
Microphone	Bruel and Kjaer 4189	2542908
Preamplifier	Larson Davis PRM900C	1445
Sound Level Calibrator	GenRad 1987 Minical 1kHz	146545011
Type I Sound Level Meter / 1/3 Octave Band Analyzer	Rion NA-28	01260173
Sound Level Calibrator	Norsonics Type 1251	26623

**Appendix B. Newton City Ordinance:**  
**Section 20. Offenses and Miscellaneous Provisions, Article II. Noise**

**ARTICLE II. NOISE**

**Sec. 20-13. Noise control.**

(a) This ordinance may be cited as the "Noise Control Ordinance of the City of Newton."

(b) *Declaration of findings and policy.* Whereas excessive sound is a serious hazard to the public health and welfare, safety, and the quality of life; and whereas a substantial body of science and technology exists by which excessive sound may be substantially abated; and, whereas the people have a right to and should be ensured an environment free from excessive sound that may jeopardize their health or welfare or safety or degrade the quality of life; now therefore it is the policy of the City of Newton to prevent excessive sound which may jeopardize the health and welfare or safety of its citizens or degrade the quality of life.

(c) *Scope.* This ordinance shall apply to the control of all sound originating within the limits of the City of Newton except as follows:

- (1) the emission of sound for the purpose of alerting persons to the existence of an emergency or the emission of sound in the performance of emergency work or in training exercises related to emergency activities; and
- (2) all snow clearance activities; and
- (3) any program or activity supervised by the parks and recreation department of the city in effect and as it exists on June 1, 1983.

(d) *Definitions.* For the purposes of this ordinance the following words and phrases shall have the meanings respectively ascribed to them by this section:

*Construction and demolition:* Any excavation, highway construction, land development or land clearing work, or the erection, demolition, alteration, repair, or relocation of any building or structure, which uses powered equipment such as backhoes, trucks, tractors, excavators, earth moving equipment, compressors, motorized, or power hand tools, manual tools, or equipment of a similar nature as well as two-way radios or other communication equipment; or use of any equipment for recycling, screening, separating, or any other processing of soil, rocks, concrete, asphalt or other raw material.

*Electronic devices:* any radio, tape recorder or player, television, phonograph, public address system, loudspeaker, amplified musical instrument or any other similar device, except two-way communication radios.

*Emergency:* any occurrence or set of circumstances involving actual or imminent physical trauma or property damage which demands immediate action.

*Emergency work:* any work performed for the purpose of preventing or alleviating the physical trauma or property damage threatened or caused by an emergency.

*Gross vehicle weight rating (GVWR):* the value specified by the manufacturer as the recommended maximum loaded weight of a single motor vehicle. In cases where trailers and tractors are separable, the gross combination weight rating (GCWR), which is the value specified by the manufacturer as the

recommended maximum loaded weight of the combination vehicle, shall be used.

*Motorcycle:* any unenclosed motor vehicle having two or three wheels in contact with the ground, including, but not limited to, motor scooters, minibikes, and mopeds.

*Motor vehicles:* any vehicle which is propelled or drawn on land by a motor, such as, but not limited to, passenger cars, trucks, truck-trailers, semi-trailers, campers, go-carts, snowmobiles, dune buggies, or racing vehicles, but not including motorcycles.

*Noise pollution:* a condition caused by a noise source that increases noise levels 10dB(A) or more above background noise level, except that if the noise source produces a tonal sound, an increase at 5dB(A) or more above background noise level is sufficient to cause noise pollution.

*Tonal sound:* any sound that is judged by a listener to have the characteristics of a pure tone, whine, hum or buzz.

*(e) Noise Pollution prohibited.*

- (4) No person shall willfully, negligently, or through failure to provide necessary equipment or facilities or to take necessary precautions permit the establishment or continuation of a condition of noise pollution caused by a noise source (other than a dog or bird) owned, leased, kept, or controlled by such person, or caused by any activity of such person.
- (5) When the offending noise source is located in public spaces, noise measurements shall be made at, and noise pollution determinations made in relation to, any location a passerby might reasonably occupy. When the offending noise source is located on private property, noise measurements shall be made at, and noise pollution determinations made in relation to, the boundary line of the property within which the offending source is located, or as close thereto as feasible.
- (6) All noise level measurements made pursuant to subsection (e) shall be made with a Type I or II A-weighted sound level meter as specified under the American National Standards Institute (ANSI) standards.

*(f) Time Restrictions.*

- (1) Notwithstanding the provisions of subsection (e) and subject to the maximum noise levels listed in subsection (g), the generation of any noise from all electric motors and/or internal combustion engines employed in yard, garden, or grounds maintenance is prohibited except during the following time periods:
  - (A) Between 7:00 a.m. and 8:00 p.m. on weekdays; or
  - (B) Between 9:30 a.m. and 8:00 p.m. on Saturdays, Sundays and legal holidays as established in section 2-26 of these revised ordinances.
- (2) Notwithstanding the provisions of subsection (e) and subject to the maximum noise levels listed in subsection (g), the generation of any noise from construction and demolition activity is prohibited except during the following time periods:

- (A) Between 7:00 a.m. and 7:00 p.m. on weekdays; or
  - (B) Between: 8:00 a.m. and 7:00 p.m. on Saturdays;
  - (C) Generation of any noise from construction and demolition activity is prohibited at any hour on Sundays and legal holidays as established in section 2-26 of these revised ordinances, except by permit issued in accordance with subsection (h)(1).
  - (3) All public address loudspeakers, either mobile or stationary, shall be prohibited from operating every evening from 9:00 p.m. until 7:00 a.m. the following morning.
  - (4) No automobile, motorcycle, truck or vehicle-mounted refrigeration equipment or other motorized vehicle shall be left running when not in traffic, within three hundred (300) feet of any dwelling, hotel or residence, for a period of greater than five (5) minutes.
  - (5) Between the hours of midnight and 6:00 a.m. deliveries and pick-ups for commercial or business purposes are prohibited within 300 feet of any dwelling within a residential zone excepting deliveries to such dwellings, deliveries of gasoline to gasoline stations, deliveries or pick-ups at state or federal governmental offices and any other commercial or business delivery or pick-up operation that does not increase noise levels 5dB(A) or more above background noise level. For purposes of this subsection, "deliveries" and "pick-ups" shall include the loading and unloading of a vehicle.
  - (6) Between the hours of 7:00 p.m. and 7:00 a.m. trash collection shall be prohibited within five hundred (500) feet of any dwelling.
  - (7) Between the hours of 11:00 p.m. and 7:00 a.m. no person or persons shall disturb the peace by causing or allowing to be made any unreasonable or excessive noise, including but not limited to such noise resulting from the operation of any electronic device, or from the playing of any band or orchestra, or from the making of excessive outcries, exclamations, or loud singing or any other excessive noise by a person or group of persons, provided however, that any performance, concert, establishment, band group or person who has received and maintains a valid license or permit from any department, board, or commission of the City of Newton authorized to issue such license or permit shall be exempt from the provisions of this section. Unreasonable or excessive noise for the purposes of this section shall be defined as 5dB(A) or more above background level when measured not closer than the lot line of a residential lot or from the nearest affected dwelling unit.
- (g) *Maximum Noise Levels.* Notwithstanding the provisions of subsections (e)(1) and (e)(2), the following are the maximum noise levels that are permitted for the specified noise sources:

*Maximum noise level dB(A) permitted:*

(1) *Vehicles*

Vehicle Class Stationary or Moving

All vehicles over 10,000 lbs. GVW or GCWR

All Motorcycles

Automobiles and light trucks

86

82

75

Noise measurements shall be made at a distance of fifty (50) feet from the closest point of pass-by of a source or fifty (50) feet from a stationary vehicle.

(2) *Construction equipment.*

Maximum noise level dB(A) permitted:

Backhoe, bulldozer, concrete mixer, dump truck, loader, paver, pneumatic tools, roller, scraper	90
Air compressor	85
Generator	90
Electric drills, sanders, saws (except chainsaws) or other power tools of all types, whether hand held or otherwise	75

Noise measurements shall be made at a distance of fifty (50) feet from the source, or from the nearest lot line, whichever distance is less.

(3) *Yard, Garden, or Grounds Maintenance Equipment*

(i) *Maximum noise level dB(A) permitted:*

Commercial Chipper, 3 1/2 inch or greater limb capacity (running at full speed but not chipping)	90
Commercial truck-mounted leaf vacuum	90
All other equipment, including home tractor, leaf blower, lawn mower or trimmer	65

Noise measurements shall be made at a distance of fifty (50) feet from the source, or from the nearest lot line, whichever distance is less.

(ii) *Transition period.* Notwithstanding the maximum maintenance equipment noise levels listed in subsection (3)(i), maximum noise levels dB(A) for all yard, garden, or grounds maintenance equipment, excluding commercial chippers and vacuums shall be as follows:

1. Maximum noise level dB(A) permitted up to two (2) years after effective date of this Section:

a) Home tractor, leaf blower	80
b) Lawn mower or trimmer	75

2. Maximum noise level dB(A) permitted from two (2) years to four (4) years after effective date of this section, all equipment

70

(4) *Maximum Noise Level Exclusions.* The following devices shall be exempt from the maximum noise limitations set forth in subsection (g)(2): jack hammers, pavement breakers; pile drivers, rock drills, provided that effective noise barriers are used to shield nearby areas from a condition of noise pollution. The time limitations contained in subsection (f)(2) shall still apply.



(5) *Tonal Sound Corrections.* When a tonal sound is emitted by a noise source specified in subsections (g)(1), (g)(2) and (g)(3) herein, the limit on maximum noise levels shall be 5dB(A) lower than as specified in subsections (g)(1), (g)(2) and (g)(3).

(6) *Maximum Noise Levels for HVAC systems.* No person shall operate any air conditioning, refrigeration or heating equipment for any residence or other structure or operate any pumping, filtering or heating equipment for any pool or reservoir in such manner as to create any noise which would cause the noise level on the premises of any other occupied property or if a condominium, apartment house, duplex, or attached business, within any adjoining unit, to exceed the background noise level by more than 5 dB(A). This provision shall not apply, however, to periodic or emergency maintenance or testing of such equipment reasonably necessary to maintain such equipment in good working order. Noise measurements and noise pollution determinations shall be taken in accordance with subsections (e)(2) and (e)(3).

(7) *Alternative Measurement Procedures.* If it is not possible to make a good noise level measurement at the distance specified in subsections (g)(1), (g)(2) and (g)(3), measurement may be made at an alternate distance and the noise level subsequently calculated for the specified distance. Calculations shall be made in accordance with established engineering procedures.

(8) All noise-level measurements made pursuant to subsection (g) shall be made with a Type I or II A-weighted sound level meter as specified under the American National Standards Institute (ANSI) standards.

(h) *Permits for exemptions from this ordinance and for extensions of time to comply with this ordinance.*

(1) The mayor or his designee may grant a permit for any activity otherwise forbidden by the provisions of this ordinance upon a determination by the mayor or his designee that compliance in the conduct of such activity would cause undue hardship on the person or persons conducting such activity or on the community, taking into account: (i) the extent of noise pollution caused by not requiring such compliance; and (ii) whether reasonable efforts have been made to abate the noise. The mayor or his designee shall establish appropriate procedures for the processing of requests for such permits, including such hearings as the mayor or his designee deems appropriate. In granting any such permit, the mayor or his designee may impose such appropriate conditions as he deems necessary pursuant to this section. Copies of all such permits shall be filed with the clerk of the board of aldermen promptly after issuance. Promptly after issuance, copies of all such permits shall be filed with the clerk of the board of aldermen and to each ward alderman for the affected ward.

(2) The mayor or his designee may extend to a specified date the time for compliance with this ordinance in the case of any particular activity with respect to which a determination is made that such extension is necessary to provide a reasonable opportunity for such activity to be brought into compliance. No such extension shall be granted which has the effect of exempting such activity from compliance with this ordinance. The mayor or his designee shall establish appropriate procedures for the processing of requests for such extensions of time, including such hearings as the mayor or his designee deems appropriate.

(i) *Judicial Review.* Any person aggrieved by the grant or denial of a permit pursuant to subsection (h)(1) or an extension of time pursuant to subsection (h)(2) may seek relief therefrom by a civil action in any court of competent jurisdiction as provided by the laws of the Commonwealth of Massachusetts.

(j) *Penalties.* Violation of any of the provisions of this section shall constitute a misdemeanor and any person, upon conviction of such violation, shall be fined an amount not to exceed one hundred dollars (\$100.00). Each day that such violation continues shall be considered to be a separate offense.

(k) *Non-criminal disposition.* In addition to the penalties set forth in subsection (j), where non-criminal disposition of specified sections of this ordinance by civil fine has been provided for in sections 20-20 and 20-21 of the Revised Ordinances, as amended, pursuant to the authority granted by G.L. c. 40, sec. 21D, said violations may be enforced in the manner provided in such statute. The civil penalty for each such violation is set out in Sections 20-21(c) and 20-21(d).

(l) *Severability.* If any provision(s) of this ordinance or the application of such provision(s) to any person or circumstances shall be held invalid, the validity of the remainder of this ordinance and the applicability of such provision to other persons or circumstances shall not be affected thereby. (Ord. No. R-331, 6-20-83; Ord. No. T-62, 12-4-89; Ord. No. T-200, 12-16-91; Ord. No. V-286, 3-6-00; Ord. Z-32, 7-14-08)

**Cross reference**—Sounding warning devices on motor vehicles, § 19-72; noise by hawkers and peddlers, § 17-26.